

PAT-NO: JP405278038A

DOCUMENT-IDENTIFIER: JP 05278038 A

TITLE: MOLD FOR MOLDING RUBBER

PUBN-DATE: October 26, 1993

INVENTOR-INFORMATION:

NAME

TANEYAMA, HIDETO

ASSIGNEE-INFORMATION:

NAME	COUNTRY
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SHIN ETSU POLYMER CO LTD	N/A

APPL-NO: JP04105521

APPL-DATE: March 31, 1992

INT-CL (IPC): B29C033/38, B29C043/36, C23C018/52

US-CL-CURRENT: 264/219

ABSTRACT:

PURPOSE: To improve a releasability to eliminate the need for a releasant and to automate a releasing operation by a method wherein a mold comprising an engraved mold and a relief mold for molding a rubber is electrolessly plated with a nickel containing a specific ratio of polytetrafluoroethylene fine particles.

CONSTITUTION: A mold for molding a rubber comprises an engraved mold 1 and a relief mold 2. In this invention, the rubber molding mold is electrolessly plated with a nickel containing 5-25vol.% polytetrafluoroethylene fine particles. In the electroless nickel plating, the content of polytetrafluoroethylene fine particles is different between the engraved mold 1 and the relief mold 2. In this manner, the releasability of the rubber molding mold is so improved that a releasant is not required. Problems, such as spotting caused by a releasant and a deterioration of a fabrication quality, are eliminated. A molded piece 4 remains on the mold plated with a nickel having a smaller content of polytetrafluoroethylene fine particles, and a releasing operation is automated.

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DERWENT-ACC-NO: 1993-374064

DERWENT-WEEK: 199347

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TITLE: Metallic mould for moulding rubber - obtd. by forming electroless nickel@ plating contg. fine PTFE particles on metallic mould, eliminates need for release agent

PATENT-ASSIGNEE: SHINANO POLYMER KK[SHINN] , SHINETSU POLYMER CO[SHPL]

PRIORITY-DATA: 1992JP-0105521 (March 31, 1992)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
JP 05278038 A	October 26, 1993	N/A	004	B29C 033/38

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
JP 05278038A	N/A	1992JP-0105521	March 31, 1992

INT-CL (IPC): B29C033/38, B29C043/36 , B29K021:00 , B29L031:34 , C23C018/52

ABSTRACTED-PUB-NO: JP 05278038A

BASIC-ABSTRACT:

The metallic mould contg. an engraving mould and an embossing mould is produced by forming an electroless nickel-plating contg. vol.% of fine particles of polytetrafluoroethylene, on a metallic mould.

USE/ADVANTAGE - The metallic mould is used for producing push-bottom type switch cover materials made of silicone rubber. The polytetrafluoroethylene fine powder is effective in high release properties. Conventional release agents, which may cause stain faults, a low mouldability, etc., are made unnecessary. (as pref. claimed) The content of the polytetrafluoroethylene fine particles is different on the engraving mould and the emboss mould.

In an example, a carbon steel S50C was discharge-processed into a metallic mould for a push-button cover material. The mould was Ni-P electroless nickel plated, dipped into a plating bath contg. Ni-P electroless nickel plating liq. and 23 vol.% of polytetrafluoroethylene fine particles with a particle size of 1 micron meter dispersed in the liq. so that a plating film is formed, followed by baking. In the compsn., N is 84 wt.

, P 9 wt.%, and polytetrafluoroethylene 7 wt.%.

CHOSEN-DRAWING: Dwg.0/2

TITLE-TERMS: METALLIC MOULD MOULD RUBBER OBTAIN FORMING ELECTROLESS NICKEL@ PLATE CONTAIN FINE PTFE PARTICLE METALLIC MOULD ELIMINATE NEED RELEASE AGENT

DERWENT-CLASS: A32 M13

CPI-CODES: A04-E08B; A06-A00C; A11-B05; A11-B11; A12-H05; A12-S09; M13-B;
M13-K;

ENHANCED-POLYMER-INDEXING:

Polymer Index [1.1]

017 ; H0124*R ; P1445*R F81

Polymer Index [1.2]

017 ; ND05 ; J9999 J2904 ; J9999 J2948 J2915 ; N9999 N6440*R

Polymer Index [2.1]

017 ; R00975 G0022 D01 D12 D10 D51 D53 D59 D69 D82 F* 7A ; H0000
; S9999 S1514 S1456 ; P0511

Polymer Index [2.2]

017 ; ND01 ; Q9999 Q7932 Q7885 ; Q9999 Q7114*R ; K9552 K9483 ; B9999
B5209 B5185 B4740 ; B9999 B5323 B5298 B5276 ; N9999 N7045 N7034
N7023 ; J9999 J2904

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0009 0207 0210 0223 0229 0231 0947 0968 1306 2344 2345 2348 2419
2459 2542 2649 2651 2728 2745 3253

Multipunch Codes: 017 03- 032 05- 229 371 376 377 38- 380 456 017 04- 062 064
087 090 371 376 393 431 47& 477 479 53- 55& 575 592 593 597 600 623 629 688

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C1993-165760

(19)日本国特許庁 (JP)

(12) **公開特許公報 (A)**

(11)特許出願公開番号

特開平5-278038

(43)公開日 平成5年(1993)10月26日

(51)Int.Cl. ⁵	識別記号	序内整理番号	F I	技術表示箇所
B 29 C 33/38		8927-4F		
43/36		7365-4F		
C 23 C 18/52	A			
// B 29 K 21:00				
B 29 L 31:34		4F		

審査請求 未請求 請求項の数 2(全 4 頁)

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(54)【発明の名称】 ゴム成形用金型

(57)【要約】 (修正有)

【目的】 本発明は成形体を容易に離型できるようにしたゴム成形用金型の提供を目的とするものである。

【構成】 本発明のゴム成形用金型は、彫り込み型と浮き出し型を有するゴム成形用金型にポリテトラフルオロエチレン微粒子を5~25容量%含有した無電解ニッケルメッキを加工してなることを特徴とするものである。

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【特許請求の範囲】

【請求項1】彫り込み型と浮き出し型を有するゴム成形用金型にポリテトラフルオロエチレンの微粒子を5~25容量%含有した無電解ニッケルメッキを加工してなることを特徴とするゴム成形用金型。

【請求項2】ゴム成形用金型の彫り込み型と浮き出し型の無電解ニッケルメッキにおけるポリテトラフルオロエチレン微粒子の含有量に差をつけてなる請求項1に記載したゴム成形用金型。

【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は彫り込み型と浮き出し型を有するゴム成形用金型、特にシリコーンゴム系の押鉗スイッチ用カバー部材の製造に有用とされるゴム成形用金型に関するものである。

【0002】

【従来の技術】ゴム成形用金型は金型製作の容易さ、コスト、耐久性などの点から従来炭素鋼で作られているが、このものは防蝕のために通常クロムメッキまたはニッケルメッキが施されている。

【0003】そして、このクロムメッキ、ニッケルメッキされたゴム成形用金型を用いて成形体を製造する場合には、成形品の脱型を容易にするために離型剤が使用されるのであるが、成形後に金型を開いたときに成形体をゴム成形用金型の彫り込み型または浮き出し型のどちらか一方に意図的にのこして離型作業を安定させるということのために、この離型剤の塗布はこの彫り込み型と浮き出し型に差をつけることが行なわれている。

【0004】

【発明が解決しようとする課題】しかし、この従来公知のゴム成形用金型で離型剤を用いてゴムを成形すると、離型剤の効果が長持ちしないために離型剤を頻繁に塗布する必要があるし、この離型剤を使用すると成形体に離型剤のシミがつくし、成形体が汚れ、さらには成形体に塗装、印刷などの二次加工するときの加工性が悪くなるという問題点がある。また、この離型についてはその離型作業を安定させるために、ゴム成形品をその彫り込み型または浮き出し型のどちらか一方に意図的に残すべく、この彫り込み型と浮き出し型の離型性のバランスをとるのであるが、これには離型剤の効果にバラつきがあるためにこれを安定させることが難しいという問題点もある。

【0005】

【課題を解決するための手段】本発明はこのような不利、問題点を解決することができるゴム成形用金型に関するものであり、これは彫り込み型と浮き出し型を有するゴム成形用金型にポリテトラフルオロエチレンの微粒子を5~25容量%含有した無電解ニッケルメッキを加工してなることを特徴とするものである。

【0006】すなわち、本発明者は離型剤を使用しない

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でゴム成形することができるゴム成形用金型を開発すべく種々検討した結果、このゴム成形用金型にポリテトラフルオロエチレン微粒子を含有した無電解ニッケルメッキをすればポリテトラフルオロエチレンがすぐれた非粘着性、低摩擦性をもつものであることから、離型剤を使用しなくても成形品の脱型ができるを見出すと共に、これによれば離型剤の使用によるシミの発生、成形品の二次加工性のわるくなることがなくなるということを確認して本発明を完成させた。以下にこれをさらに詳述する。

【0007】

【作用】本発明はゴム成形用金型に関するものであり、これはゴム成形用金型にポリテトラフルオロエチレンの微粒子を5~25容量%含有した無電解ニッケルメッキを加工してなることを特徴とするものであるが、これによればポリテトラフルオロエチレンがすぐれた非粘着性、低摩擦性をもつものであることから、離型剤を使用しなくても成形品の脱型を容易に行なうことができるという有利性が与えられる。

【0008】本発明は、ゴム成形用金型に関するものであるということから、このものは炭素鋼で作られたものとされるが、このものは防蝕のためにニッケルメッキされたものとされる。しかし、本発明におけるゴム成形用金型は離型剤を使用しなくても成形品を容易に脱型させるために、このニッケルメッキはポリテトラフルオロエチレンの微粉末を含有した無電解ニッケルメッキで行なわれる。

【0009】このポリテトラフルオロエチレン微粉末を含有した無電解ニッケルメッキは、公知の無電解ニッケルメッキ法、すなわちトリクロロエチレン洗浄、アルカリ脱脂、酸洗い、電解脱脂などの前処理工程後に、Ni-Pの無電解メッキを用いる方法において、この電解液にポリテトラフルオロエチレン微粉末を分散させたものを主成分として行なえばよいが、この処理に当ってはこれに錯化剤、pH調節剤、pH緩衝剤、安定剤、改良剤などの補助成分を添加した配合溶液中に金型を浸透すればよく、これによれば密着力のすぐれた均一厚さの均質なニッケル皮膜が得られるし、これを熱処理すればさらに耐摩耗性のすぐれた皮膜が得られる。

【0010】なお、ここに使用されるポリテトラフルオロエチレン微粉末の粒径はこの金型への付着によって金型を離型性のすぐれたものとするということから粒径が0.1~1 μm のものとすればよいが、無電解ニッケルメッキ溶中におけるこのポリテトラフルオロエチレン微粉末の含有量はこれが5容量%未満ではその離型性が不十分なものとなり、これが25容量%より多くなるとメッキの硬度が下がり、ゴム成形用金型のメッキとして適さないものとなるので、これは5~25容量%の範囲とすることが必要とされる。

【0011】このポリテトラフルオロエチレン微粉末を

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含有した無電解ニッケルメッキ加工されたゴム成形用金型はこれによってゴム成形体との摩擦抵抗が従来のクロムメッキ、ニッケルメッキされたものとゴム成形体との摩擦抵抗に比べて非常に小さくなるので、このものは離型剤を使用しなくてもゴム成形品を容易に脱型させることができると有利性が与えられる。

【0012】しかし、このゴム成形用金型については、そのゴム成形品を金型の彫り込み型または浮き出し型のいずれかに置くことが要望されるので、これについてはこの金型を無電解ニッケルメッキするときに、彫り込み型と浮き出し型でこの無電解ニッケルメッキ浴に添加するポリテトラフルオロエチレン微粒子の含有量に差を設けておけば、離型剤なしでゴムを成形したときに、ポリテトラフルオロエチレン微粒子の含有量が少なかった側にゴム成形品が残るので、このいずれかにゴム成形品を残留させるかを任意に選択することができる。

【0013】つぎに本発明のゴム成形金型を用いてゴム成形品を製造する方法を添付の図面にもとづいて説明する。図1、図2はいずれも本発明のゴム成形用金型を用いてゴム成形品を圧縮成形するときの縦断面図を示したものである。ここに使用されるゴム成形用金型は彫り込み型1と浮き出し型2からなるもので、これらはいずれもポリテトラフルオロエチレン微粒子を含有する無電解ニッケルメッキ処理されたものであるが、図1の(a)はこれに成形用ゴム板3を存在させたものが示されており、図1の(b)にはこれを圧縮成形したときに目的の成形品である押鉗スイッチ用カバー部材4の成形された状態が、また、図1の(c)にはこれを脱型したときの状態が示されている。

【0014】なお、これによれば離型剤の塗布なしで目的とする成形品の脱型できることが明らかであるが、図2には彫り込み型1と浮き出し型2でこの無電解ニッケルメッキ時におけるポリテトラフルオロエチレン微粒子の含有量に差をつけて浮き出し型におけるポリテトラフルオロエチレン微粒子の含有量を彫り込み型のそれよりも少ないときに成形品が浮き出し型に残留したことが示されている。

【0015】

【実施例】つぎに本発明の実施例をあげる。

実施例1

炭素鋼S50Cを切削し、放電加工してゴム製押鉗スイッチ用カバー部材を成形する金型を作成し、これをトリクロロエチレンで洗浄し、塩酸で酸洗し、さらに電解脱脂し再度酸洗いした。

【0016】ついでこのものにNi-Pの無電解ニッケルメッキを1μmの厚さに加工してから、Ni-Pの無電解ニッケルメッキ液に粒径が1μmのポリテトラフルオロエチレン微粒子を23容量%分散させたメッキ浴中にこの金型を1時間浸漬したところ、金型表面に密着力のすぐれた、均一の厚さの均質な厚さ7μmの被覆膜をも

つ金型が得られた。

【0017】このようにして得られたメッキ皮膜の組成比はNiが84重量%、Pが9重量%、ポリテトラフルオロエチレンが7重量%というものであったが、これについてはその強度向上のために200°Cでベーリング処理したのち、300°Cの熱処理を4時間行なったところ、ポリテトラフルオロエチレンの微粒子を含有した無電解ニッケルメッキをしたゴム成形用金型が得られた。

【0018】つぎにこの金型を170°Cに加熱したのち、シリコーンゴム・KE9510U〔信越化学工業(株)製商品名〕100重量部に有機過酸化物・C-8〔信越化学工業(株)製商品名〕2重量部を加え、オープンロールで均一に混合して得たゴム組成物をこの金型に装入し、その彫り込み型と浮き出し型を閉め、90kgf/cm²、170°Cで10分間加圧、加熱してから彫り込み型と浮き出し型を開いたところ、成形体は彫り込み型にのこり、この成形体は容易に離型することができた。

【0019】実施例2

実施例1におけるNi-P無電解ニッケルメッキを1μm

加工した金型をポリテトラフルオロエチレン微粒子を含有した無電解ニッケルメッキ浴で処理するときに、その彫り込み型にはポリテトラフルオロエチレン微粒子を23容量%含有した液を、浮き出し型にはポリテトラフルオロエチレン微粒子を10容量%含有した液を使用して無電解ニッケルメッキでそれぞれに7μmのメッキ皮膜を設け、実施例1と同様に熱処理して、ゴム成形用金型を作成した。

【0020】つぎにこの金型を用いて、ここに実施例1と同じゴム組成物を装入し、実施例1と同じ条件で加熱加圧して成形を行ない、金型を開いたところ、成形体はポリテトラフルオロエチレン微粒子の含有量が少なかった浮き出し型にのこったが、これから成形品の離型は容易に行なうことができた。

【0021】

【発明の効果】本発明は、ゴム成形用金型に関するもので、これは前記したように彫り込み型と浮き出し型を有するゴム成形用金型にポリテトラフルオロエチレンの微粒子を5~25容量%含有した無電解ニッケルメッキを加工してなることを特徴とするものであるが、これによればこの金型の離型性が向上するので離型剤を使用する必要がなくなり、したがって離型剤によるシミつき、成形体の二次加工性が悪くなるということもなくなるという有利性が与えられる。

【0022】また、この場合その彫り込み型と浮き出し型でここに使用するポリテトラフルオロエチレン微粒子の含有量に差をつければ成形体はこのポリテトラフルオロエチレン含有量の少ない側の型にのこるので、離型の自動化が可能となるという産業上の有利性が与えられる。

50 【図面の簡単な説明】

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【図1】本発明の実施例1によるゴム製スイッチ用カバ一部材製造における縦断面図を示したもので、(a)はゴム組成物の装入、(b)は成形、(c)は成形品の離型を示したものである。

【図2】本発明の実施例2によるゴム製スイッチ用カバ

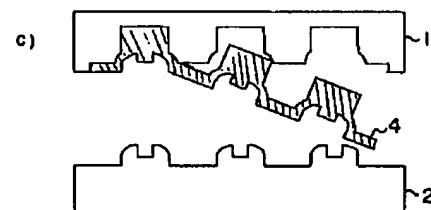
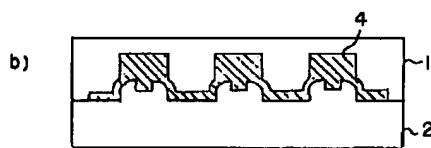
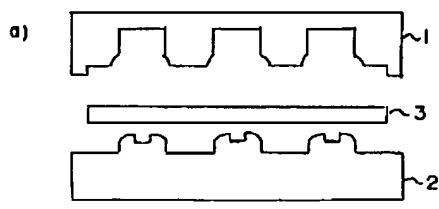
6

一部材の製造における離型状態の縦断面図を示したものである。

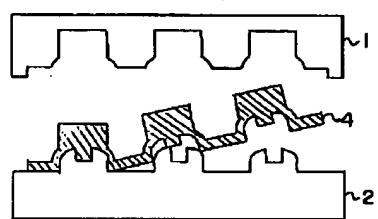
【符号の説明】

1……彫り込み型、2……浮き出し型、3……ゴム組成物、4……成形体。

【図1】



【図2】



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CLAIMS

[Claim(s)]

[Claim 1] The rubber molding die characterized by coming to process the electroless nickel plating which did 5-25 capacity % content of the particle of polytetrafluoroethylene into the rubber molding die which carves, comes up with a lump mold and has a mold.

[Claim 2] The rubber molding die indicated to claim 1 which a rubber molding die carves, comes up with a lump mold, and comes to attach a difference to the content of the polytetrafluoroethylene particle in the electroless nickel plating of a mold.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Industrial Application] This invention relates to the rubber molding die which carves, comes up with a lump mold and has a mold, especially the rubber molding die made useful to manufacture of the covering member for a push button switch of a silicone rubber system.

[0002]

[Description of the Prior Art] Although the rubber molding die is conventionally made from points, such as an ease of a metal mold fabrication, cost, and endurance, with carbon steel, as for this thing, chrome plating or nickel plating is usually performed for anticorrosion.

[0003] And although a release agent is used in order to make unmolding of mold goods easy when manufacturing a Plastic solid using this chrome plating and the rubber molding die by which nickel plating was carried out When metal mold is opened after shaping, a rubber molding die carves a Plastic solid, it comes up and, as for spreading of this release agent, this thing [carving, coming up with a lump mold and distinguishing between a mold] is performed [sake / the lump mold or / of stabilizing a ***** activity intentionally in one of the molds].

[0004]

[Problem(s) to be Solved by the Invention] However, if rubber is fabricated by this conventionally well-known rubber molding die using a release agent, since the effectiveness of a release agent will not last long, if it is necessary to apply a release agent frequently and this release agent is used, the silverfish of a release agent will take lessons from a Plastic solid, and the trouble that dirt and workability when carrying out fabricating, such as paint and printing, worsen [a Plastic solid] is in a Plastic solid further. Moreover, in order to stabilize that mold release activity about this mold release, that trouble that carve and it is difficult a lump mold or to stabilize this since [this] it is in the effectiveness of a release agent with a rose at this, although it carves, it comes up with a lump mold and the mold-release characteristic of a mold is balanced in order to come up and to leave intentionally to one of the molds also exists rubber mold goods.

[0005]

[Means for Solving the Problem] This is characterized for the particle of polytetrafluoroethylene by coming to process the electroless nickel plating carried out 5-25 capacity % content at the rubber molding die which carves, comes up with a lump mold and has a mold about the rubber molding die to which this invention can solve such disadvantage and a trouble.

[0006] Namely, the result examined variously that this invention person should develop the rubber molding die which can carry out rubber shaping without using a release agent, The non-adhesiveness in which polytetrafluoroethylene was excellent when making electroless nickel plating containing a polytetrafluoroethylene particle this rubber molding die, While finding out that unmolding of mold goods can be performed even if it does not use a release agent since it has low friction nature, according to this, it checked that the thing of generating of the silverfish by the activity of a release agent and the fabricating nature of mold goods to worsen is lost, and this invention was completed. This is explained

further in full detail below.

[0007]

[Function] This invention relates to a rubber molding die, and in the particle of polytetrafluoroethylene, although characterized by coming to process the electroless nickel plating carried out, since [this / molding die / rubber / 5-25 capacity % content] it has non-adhesiveness and low friction nature excellent in polytetrafluoroethylene according to this, even if it does not use a release agent, the profitableness that mold goods can be unmolded easily is given.

[0008] Although it should be made by this thing with carbon steel since it said that this invention was a thing about a rubber molding die, nickel plating should be carried out by this thing for anticorrosion. However, since the rubber molding die in this invention makes mold goods unmold easily even if it does not use a release agent, it is carried out by this nickel plating by the electroless nickel plating containing the impalpable powder of polytetrafluoroethylene.

[0009] The electroless-nickel-plating containing this polytetrafluoroethylene impalpable powder In the approach of using the electroless-deposition of nickel-P after head end processes, such as a well-known electroless-nickel-plating-method, i.e., trichloroethylene washing, alkaline degreasing, pickling, and electrolytic degreasing Although what is necessary is just to perform the thing which made this electrolytic solution distribute polytetrafluoroethylene impalpable powder as a principal component In this processing, to this, a complexing agent, a pH regulator, a buffer for pH, a stabilizer, According to this, a nickel coat with the homogeneous homogeneity thickness which was excellent in the adhesion force is obtained that what is necessary is just to permeate metal mold into the combination solution which added auxiliary components, such as an amelioration agent, and if this is heat-treated, the wear-resistant outstanding coat will be obtained further.

[0010] In addition, for the particle size of the polytetrafluoroethylene impalpable powder used here, particle size since metal mold is said that the mold-release characteristic should be excellent by adhesion in this metal mold is 0.1-1 micrometer. Although what is necessary is just to consider as a thing As for the content of this polytetrafluoroethylene impalpable powder in ***** this will become inadequate [under 5 capacity % / that mold-release characteristic]. Since it will become what the degree of hardness of plating falls and is not suitable as plating of a rubber molding die if this increases more than 25 capacity %, it is needed for this to consider as the range of 5 - 25 capacity %.

[0011] Since the rubber molding die containing this polytetrafluoroethylene impalpable powder by which electroless-nickel-plating processing was carried out becomes very small compared with the chrome plating of the former [frictional resistance / with a rubber Plastic solid], and the frictional resistance of the thing and rubber Plastic solid by which nickel plating was carried out by this, even if this thing does not use a release agent, the profitableness of the ability to make rubber mold goods unmolding easily is given.

[0012] However, since metal mold carves those rubber mold goods and a lump mold or to come up and to put on either of the molds are demanded about this rubber molding die If the difference is prepared in the content of the polytetrafluoroethylene particle which carves, comes up with a lump mold and is added to this electroless-nickel-plating bath with a mold when carrying out electroless nickel plating of this metal mold about this Since rubber mold goods remain in the side which had few contents of a polytetrafluoroethylene particle when rubber is fabricated without a release agent, it can choose as arbitration whether rubber mold goods are made to remain to this either.

[0013] How to use the rubber shaping metal mold of this invention next, and to manufacture rubber mold goods is explained based on an attached drawing. Drawing 1 and drawing 2 show drawing of longitudinal section in case each presses rubber mold goods using the rubber molding die of this invention. The rubber molding die used here carves, comes up with the lump mold 1, consist of a mold 2, and each of these contains a polytetrafluoroethylene particle, and although electroless-nickel-plating processing is carried out drawing 1 the thing which made the rubber plate 3 for shaping exist in this shows (a) -- having -- **** -- drawing 1 the condition that the covering member 4 for a push button switch which is the target mold goods when this is pressed into (b) was fabricated -- moreover, drawing 1 The condition when unmolding this is shown in (c).

[0014] In addition, according to this, it is clear that the target mold goods can be unmolded without spreading of a release agent, but having engraved drawing 2, having come up with the lump mold 1, having distinguished between the content of the polytetrafluoroethylene particle at the time of this electroless nickel plating, having come up to it with the mold 2, and having carved the content of the polytetrafluoroethylene particle in a mold, mold goods having come up, when fewer than that of a lump mold, and having remained in the mold is shown.

[0015]

[Example] Next, the example of this invention is given.

The metal mold which cuts and carries out the electron discharge method of example 1 carbon-steel S50C, and fabricates the covering member for the push button switch made of rubber was manufactured, and this was washed by the trichloroethylene, and with the hydrochloric acid, acid washing was carried out, electrolytic degreasing was carried out further, and it pickled again.

[0016] Subsequently, it is 1 micrometer about the electroless nickel plating of nickel-P to this thing.

After processing thickness, particle size is 1 micrometer to the electroless-nickel-plating liquid of nickel-P. 7 micrometers in thickness with the thickness of homogeneity homogeneous when this metal mold is immersed for 1 hour during the plating bath which did 23 capacity % distribution of a polytetrafluoroethylene particle which excelled [front face / metal mold] in the adhesion force Metal mold with the coat film was obtained.

[0017] Thus, for the presentation ratio of the obtained plating coat, nickel is the sake of the improvement in on the strength about this, although P calls and polytetrafluoroethylene called it 7 % of the weight 9% of the weight 84% of the weight. When heat treatment of 300 degree C after carrying out baking processing at 200 degrees C was performed for 4 hours, the rubber molding die which carried out electroless nickel plating containing the particle of polytetrafluoroethylene was obtained.

[0018] Next, it is this metal mold. Silicone rubber and KE9510U after heating at 170 degrees C [the trade name by Shin-Etsu Chemical Co., Ltd.] Organic peroxide and the C-8 [trade name by Shin-Etsu Chemical Co., Ltd.] 2 weight section are added to the 100 weight sections. The rubber constituent mixed and obtained to homogeneity with an opening roll is inserted in this metal mold. When [that] shut the mold, carved and came up with the lump mold, it carved after pressurizing and heating for 10 minutes at 90 kgf/cm² and 170 degree C, and it came up with the lump mold and the mold was opened, the Plastic solid was able to be carved and ***** and this Plastic solid were able to be easily released from mold in the lump mold.

[0019] It is 1 micrometer about the nickel-P electroless nickel plating in example 2 example 1. When processing the processed metal mold by the electroless-nickel-plating bath containing a polytetrafluoroethylene particle, it carves, the liquid which did 23 capacity % content of a polytetrafluoroethylene particle is come up to a lump mold, and the liquid which did 10 capacity % content of a polytetrafluoroethylene particle is used for a mold, and it is 7 micrometers to each at electroless nickel plating. The plating coat was prepared, it heat-treated like the example 1, and the rubber molding die was manufactured.

[0020] when next used this metal mold, the same rubber constituent as an example 1 was inserted in here, it fabricated by having carried out heating application of pressure on the same conditions as an example 1 and metal mold was opened, the Plastic solid had few contents of a polytetrafluoroethylene particle -- it was able to come up and ***** was able to perform mold release of future mold goods in the mold easily.

[0021]

[Effect of the Invention] To the rubber molding die which this is carved as described above, and it comes up with a lump mold about a rubber molding die, and has a mold, although [5-25 capacity % content] characterized by coming to process the electroless nickel plating carried out, this invention the particle of polytetrafluoroethylene silverfish according [since the mold-release characteristic of this metal mold improves according to this, it becomes unnecessary to use a release agent therefore, and] to a release agent -- the profitableness that with and the fabricating nature of a Plastic solid worsen [stop / *****] is given.

[0022] Moreover, if distinguished between the content of that polytetrafluoroethylene particle that carves, comes up with a lump mold and is used here with a mold in this case, as for a Plastic solid, the profitableness on the industry of being that of ***** and becoming automatable [mold release] at the mold by the side of [few] this polytetrafluoroethylene content will be given.

[Translation done.]